LD-450
5/12/09

COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION

DIVISION: MATERIALS

REPORT COVER SHEET

Investigation for Minor Foundations/Drainage Facilities The Woods Road Re-alignment Project No. 0771-053-P42, C501
March 30, 2015
David P. Shiells, P.E.

COMMONWEALTH OF VIRGINIA
DAVID PATRICK
SHIELLS
Lic. No. 024078
PROFESSIONAL ENGINEER

David P Shiells
2015.03.30 10:28:58-04'00'

VDOT Materials
Northern Virginia District

Responsible for All Pages

Project Description	The Woods Road Re-alignment Loudoun County
From:	1.23 mi. West of Evergreen Mills Road (Route 621)
To:	Evergreen Mills Road (Route 621)
Project UPC No.:	90725

COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
4975 Alliance Drive
Fairfax, VA 22030

CHARLES A. KILPATRICK, P.E.
COMMISSIONER

March 30, 2015

MEMORANDUM

TO: Mr. William C. Britt, P.E.

SUBJECT: Investigation for Minor Foundations/Drainage Facilities
The Woods Road Re-alignment
Project Number: 0771-053-P42, C-501; UPC: 90725
From: 1.23 miles W. of Evergreen Mills Road (Route 621)
To: Evergreen Mills Road (Route 621)
Length: 1.233 miles

Attached please find seven (7) Standard Penetration Test (SPT) logs for borings performed along the proposed alignments of various drainage facilities and the proposed footprint of the storm water management (SWM) basins to be constructed on the referenced project. Recommendations for individual facilities are given below.

SWM Pond No. 1, Station 271+50, Right of Centerline, Borings SWM-1 and SWM-2
(Proposed Pond Bottom Elevation: 307.0 ft; Proposed Forebay bottom elevation: 318.0 ft)

The project plans indicate that the SWM pond is to be constructed as an excavated basin. In general, the materials encountered in borings consist of lean CLAY with various amounts of fine to coarse sand and fine rock fragments. Clayey SAND/sandy lean CLAY with fine gravel was encountered beneath the lean CLAY in boring SWM-2. Ground water was not encountered during drilling. Boring SWM-1 was dry after 24 hours.

The boring logs indicate that no significant impediment exists for the construction of the SWM pond at the proposed location. In addition to the topsoil, we estimate that 30% of the excavated material will be unsuitable for use in construction of the SWM pond embankments due to high moisture content. Imported fill material for embankments should meet AASHTO classification A-4 or finer. All topsoil must be stripped from beneath embankment footprints. Any areas of the embankment that will bear on residual soils shall have the subgrade of the embankments compacted to 95% of maximum density using a sheepsfoot roller prior to embankment construction.

SWM Pond No. 2, Station 285+50, Right of Centerline, Borings SWM-3 and SWM-4
(Proposed Pond Bottom Elevation: 313.0 ft)

The project plans indicate that the SWM pond is to be constructed as an excavated basin. In general, the materials encountered in borings consist of lean CLAY with traces of fine to coarse sand.

Possible fat CLAY may be encountered beneath the lean CLAY in boring SWM-4. Ground water was not encountered during drilling. Ground water was stabilized after 48 hours at elevation 314.88 ft (1.88 ft ***above*** the base of the pond elevation). Boring SWM-4 was dry after 24 hours but high moisture contents indicate proximate ground water or perched ground water. The designer should evaluate the pond capacity assuming ground water at elev. 315.00 feet.

The boring logs indicate that no significant impediment exists for the construction of the SWM basin at the proposed location. In addition to the topsoil, we estimate that 50% of the excavated material will be unsuitable for use in construction of the SWM pond embankments due to high moisture content. Fat CLAY excavated from this site may not be used for construction of roadway embankments but is suitable for SWM embankment. Imported fill material for embankments should meet AASHTO classification A-4 or finer. All topsoil must be stripped from beneath embankment footprints. Any areas of the embankment that will bear on residual soils shall have the subgrade of the embankments compacted to 95% of maximum density using a sheepsfoot roller prior to embankment construction.

36" Diameter Storm Drainage Pipe at Str. 9-1, Station 283+03, The Woods Road, Boring P-3
(Invert in: 313.00 ft; Invert out: 312.10 ft; Maximum Cover: 6 ft)

The material encountered at the invert elevation of the proposed pipe consists of soft lean CLAY with traces of fine sand and organics atop firm FAT CLAY which does not have adequate strength to support the proposed pipe. Ground water was stabilized after 48 hours at elevation 307.45ft (4.65ft below invert elevation).

We recommend that 18" of No. 25 or No. 26 aggregate in accordance with PB-1 for Soft, Yielding, or Otherwise Unsuitable Material, be placed beneath the entire length of the proposed pipe. We estimate that all of the excavated material will be unsuitable for use as fill material due to high moisture content and contamination with organics.

Triple 5' x 4' Box Culvert at Str. 7-1, Station 272+70, The Woods Road, Borings P-1 and P-2
(Invert in: 317.80 ft; Invert out: 316.80 ft; Maximum Cover: 5.0 ft)

The material encountered at the invert elevation of the proposed culvert consists of very soft lean CLAY with organics and TOPSOIL. Ground water was not encountered during drilling and was stabilized after 24 hours at elevations 318.01 ft. and 312.5 ft. in borings P-1 and P-2, respectively (0.21ft ***above*** invert elevation in boring P-1 and 4.3 ft. below invert elevation in boring P-2).

We recommend that 18" of No. 2 or No. 3 aggregate, completely wrapped in a woven geotextile subgrade stabilization fabric, topped with 6" No. 25/No. 26 aggregate bedding in accordance with PB-1 Box Culvert Bedding for Soft, Yielding, or Otherwise Unsuitable Material, be placed beneath the entire length of the proposed culvert. We estimate that all of the excavated material will be unsuitable for use as fill material due to high moisture content and contamination with organics.

Material anticipated to be unsuitable for pipe backfill when using open cut installation shall be removed from the site and replaced with either regular excavation or suitable borrow material. The designer shall take this into consideration when calculating earthwork quantities.

If you have any questions, please call Kyana Jennings at (703) 259-2917.

Prepared by:

Kyana Jennings
Geotechnical Engineer

For:

David P. Shiells, P.E.
District Materials Engineer

Attachments:

Boring Location Plan Sheet (3)
Field Soil Descriptions (1)
Boring Logs (7)

cc: Mr. William C. Cuttler, P.E.
Mr. Steve Bates, P.E.
Mr. Pawan Sarang, P.E.
File

Q:\Mat\ RECOMMENDATIONS & REPORTS\Minor Foundation and SWM Basin Reports\ 0771-053-P42, C501\ Minor Foundation Recommendations with letterhead.doc

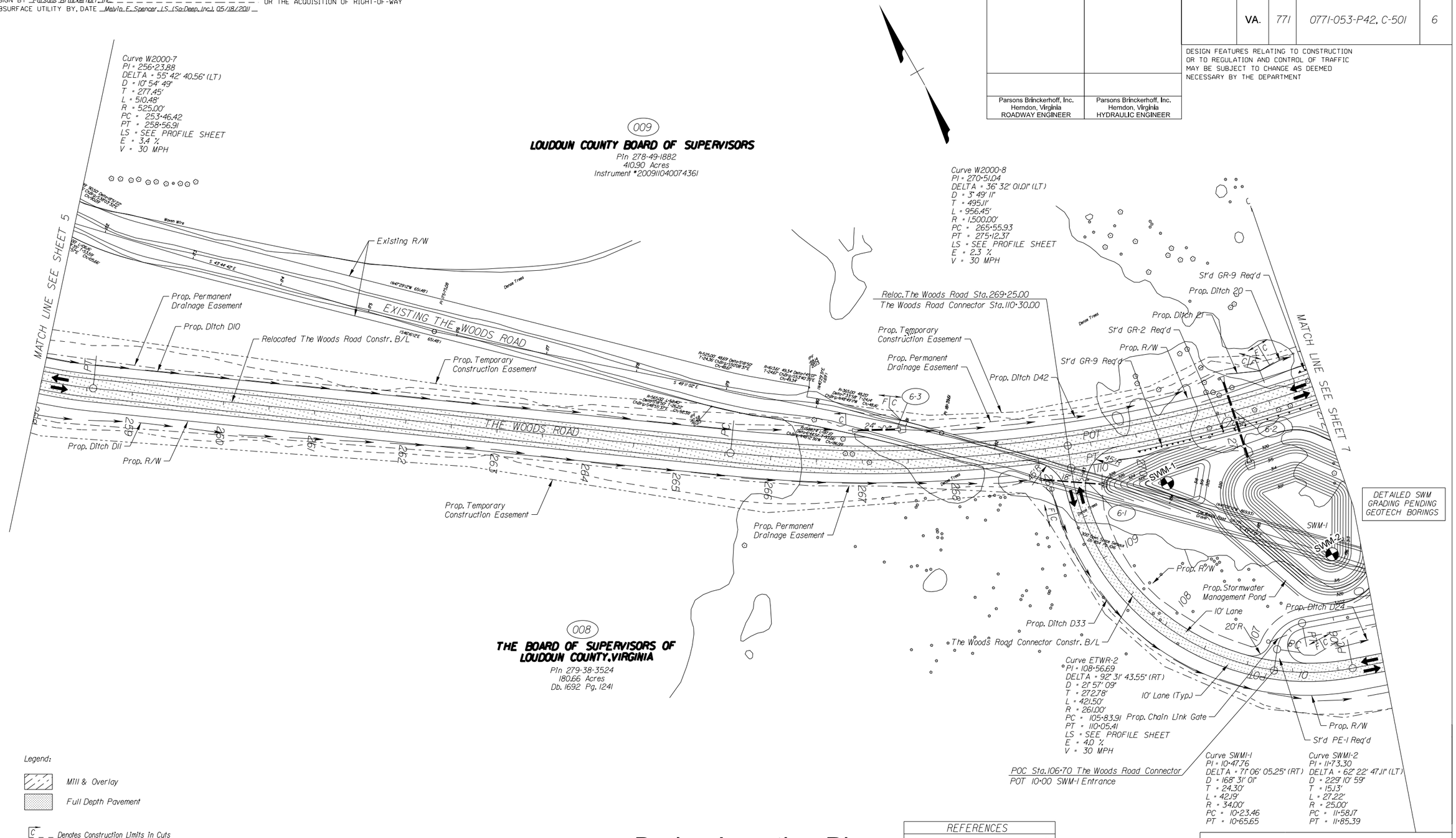
PROJECT MANAGER _Calvin Britt, PE (703) 259-2961 (VDOT NOVA)_
SURVEYED BY, DATE _Tami A. Lenox, LS (ATCS, P.L.C.), 03/12/2011_
DESIGN BY _Parsons Brinckerhoff, Inc._
SUBSURFACE UTILITY BY, DATE _Melvin E. Spencer, LS (Subsurface, Inc.), 05/18/2011_

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT-OF-WAY

Parsons Brinckerhoff, Inc. Herndon, Virginia ROADWAY ENGINEER	Parsons Brinckerhoff, Inc. Herndon, Virginia HYDRAULIC ENGINEER

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	771	0771-053-P42, C-501	6

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



Legend:

- Mill & Overlay
- Full Depth Pavement
- C _ _ Denotes Construction Limits in Cuts
- F _ _ Denotes Construction Limits in Fills

Notes:
1. Figures in parenthesis and dot - dot - dashed lines denote Temporary Easements.
2. Figures in brackets and dot - dashed lines denote Permanent Easements.

Boring Location Plan

Legend:
- Indicates Boring Location

REFERENCES	
Survey Alignment Data	ID
Constr. Alignment Data	IE
Typical Section	2A, 2B
Mainline Profile	6A
Drainage Descriptions	II

SCALE
0 50' 100'

THE WOODS ROAD
PLAN
STA. 258+00 TO STA. 272+00

PROJECT	SHEET NO.
0771-053-P42, C501	6

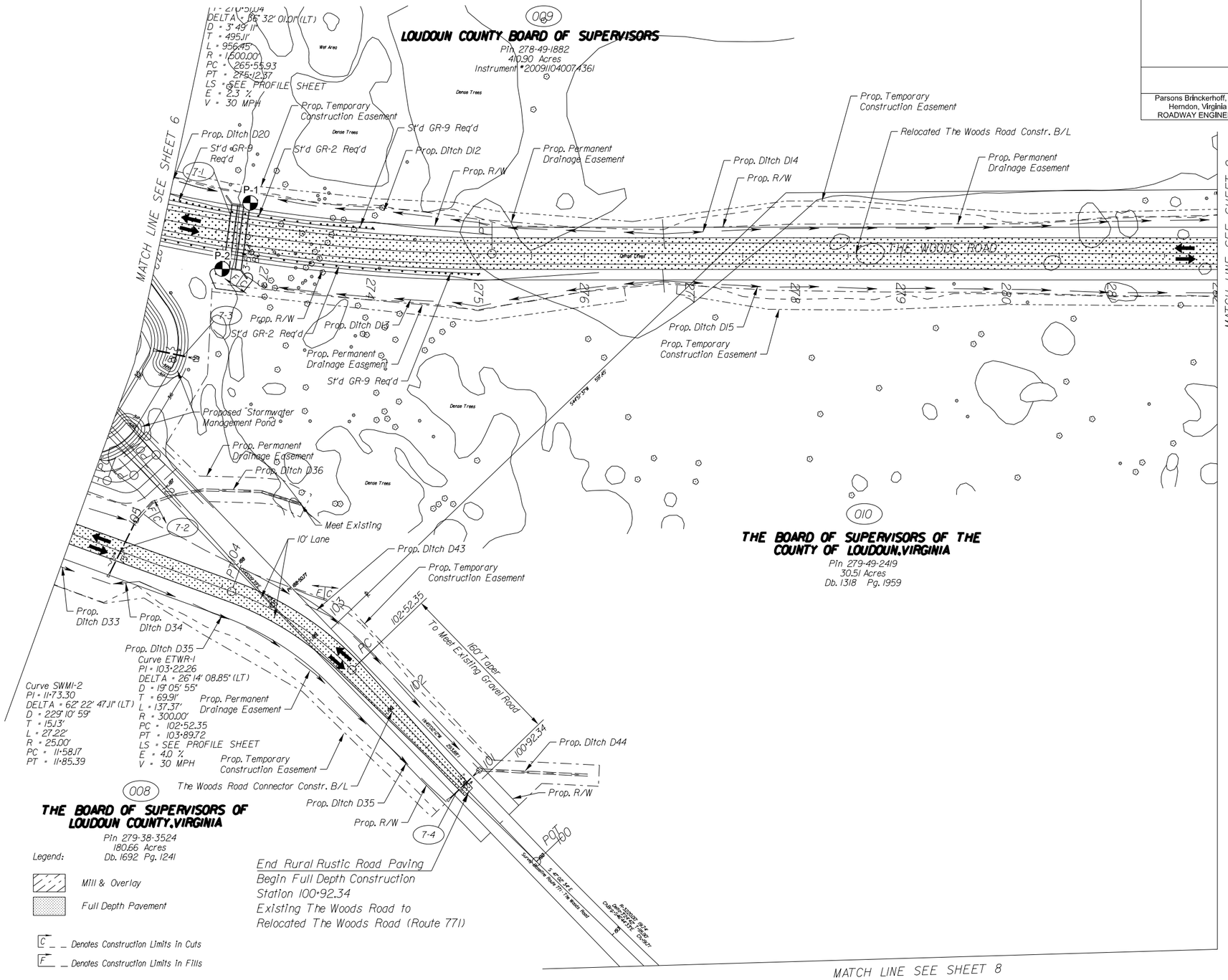
PROJECT MANAGER _Calvin Britt, PE (703) 259-2961 (VDOT NOVA)_
SURVEYED BY, DATE _Tami A. Lenox, LS (ATCS, P.L.C.) 03/12/2011_
DESIGN BY _Parsons Brinckerhoff, Inc._
SUBSURFACE UTILITY BY, DATE _Melvin E. Spencer, LS (So-Deep, Inc.) 05/18/2011_

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT-OF-WAY

Parsons Brinckerhoff, Inc. Herndon, Virginia ROADWAY ENGINEER	Parsons Brinckerhoff, Inc. Herndon, Virginia HYDRAULIC ENGINEER

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	771	0771-053-P42, C-501	7

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



Boring Location Plan

Legend:

◔ Indicates Boring Location

REFERENCES	
Survey Alignment Data	ID
Constr. Alignment Data	IE
Typical Section	2A, 2B
Mainline Profile	7A
Drainage Descriptions	II

THE WOODS ROAD
PLAN
STA. 272+00 TO STA. 282+00

	PROJECT	SHEET NO.
	0771-053-P42, C501	7

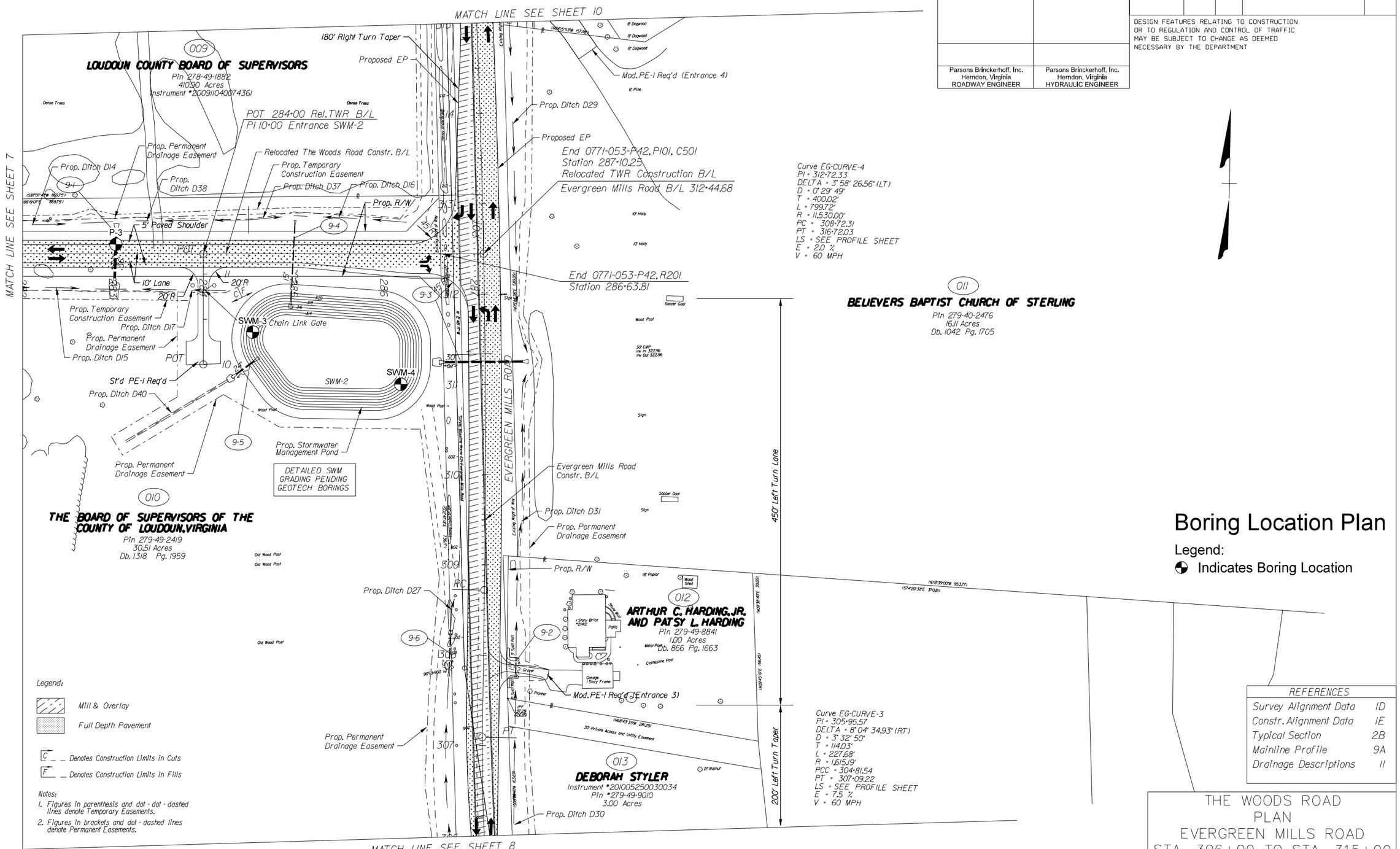
PROJECT MANAGER _Calvin Britt, PE (703) 259-2961 (VDOT NOVA)_
SURVEYED BY, DATE _Tami A. Lenox, LS (ATCS, P.L.C.), 03/12/2011_
DESIGN BY _Parsons Brinckerhoff, Inc._
SUBSURFACE UTILITY BY, DATE _Melvin E. Spencer, LS (Soil Deep, Inc.), 05/18/2011_

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT-OF-WAY

Parsons Brinckerhoff, Inc. Herndon, Virginia ROADWAY ENGINEER	Parsons Brinckerhoff, Inc. Herndon, Virginia HYDRAULIC ENGINEER

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	771	0771-053-P42, C-501	9

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



Legend:

- Mill & Overlay
- Full Depth Pavement
- C _ _ Denotes Construction Limits in Cuts
- F _ _ Denotes Construction Limits in Fills

Notes:
1. Figures in parenthesis and dot - dot - dashed lines denote Temporary Easements.
2. Figures in brackets and dot - dashed lines denote Permanent Easements.

Boring Location Plan

Legend:
- Indicates Boring Location

REFERENCES	
Survey Alignment Data	ID
Constr. Alignment Data	IE
Typical Section	2B
Mainline Profile	9A
Drainage Descriptions	II

SCALE
0 50' 100'

THE WOODS ROAD
PLAN
EVERGREEN MILLS ROAD
STA. 306+00 TO STA. 315+00

	PROJECT	SHEET NO.
	0771-053-P42, C501	9

FIELD SOIL DESCRIPTIONS
VDOT NOVA MATERIALS BORING LOGS
(VDOT Materials MOI, Chapter III, approx.)

DESCRIPTION FORMAT:
Geologic Origin, color, primary grain size descriptor, secondary component, PRIMARY COMPONENT (all caps), with...or trace... , contains... , relative density, moisture (estimated USCS Group Symbol)

GEOLOGIC ORIGIN:
This is a simple one-word description of the assumed origin of the soil. Capitalize the first letter of the word. Common terms include:
Fill: It is critical to recognize the presence of disturbed soils or man-made fill. Generally, the presence of FILL can be easily recognized in two ways: the topography around the borehole and/or the presence of highly disturbed or man-made materials in SPT samples. POSSIBLE FILL may also be used in the description if you are unsure. It can be expanded to RUBBLE FILL, ORGANIC FILL, TRASH FILL, etc. Where fill is identified, the term should also be included as part of the PRIMARY COMPONENT. Ex.: Fill, brown f-c silty SAND FILL (SM)
Residual: *Soil* which developed in place from parent bedrock. If relic rock structure is present, describe it as a soil but include a parenthetical reference to the parent rock type as prescribed under 'Friable' beneath *Intermediate Geomaterials*, below. **If it is 50/6" or greater, use the *Intermediate Geomaterials* protocol as noted**.
Alluvial: Soil which was transported and deposited by the movement of water. It is normally intended to mean placement by streams or rivers.
Colluvial: Soil which was transported and deposited by gravity, such as from landslides or from cliff debris or talus.
Palustrine: Soil was deposited in a swamp or wetland environment.

COLOR:
First impressions are best; the color description should be simple and use commonly recognized colors. Don't use "*-ish*". *Mottled* indicates splotches of various colors. *Variegated* indicates thin layers of various colors.

SAND AND GRAVEL GRAIN SIZE ADJECTIVES

SIZE:	3"	¾"	¼"	No.10	No.40	No. 200	
SIZE DESCRIPTION:	GRAVEL		SAND				SILT TO CLAY
RANGE:	**coarse** | **fine**		**coarse**	**medium**	**fine**		

- *Cobbles* are +3 inches to 12 inches.
- *Boulders* are +12 inches.

NOTE: Where the particles are of multiple sizes, use the first letters of the various sizes separated by a dash. Ex.: f-c GRAVEL, f-m SAND, m-c SAND, etc.

PRIMARY AND SECONDARY COMPONENTS

Primary Component (>50%) and secondary component ("..y") are written in ALL CAPITAL LETTERS

Primary Component: SAND or GRAVEL		**Primary Component: SILT or CLAY**			
>12% fines	'**SILTY**' or '**CLAYEY**' will be the secondary component	≥ 30% (one third) sand/gravel	more sand than gravel, '**SANDY**' will be the secondary component	≥15% gravel	add 'with gravel'
				<15% gravel	add 'trace gravel'
5% to 12%	add 'with silt' or 'with clay' to description		more gravel than sand, '**GRAVELLY**' will be the secondary component	≥15% sand	add 'with sand'
				<15% sand	add 'trace sand'
< 5% fines	add 'trace silt' or 'trace clay' to description	< 30% sand/gravel	15 % to 29% sand/gravel	'with sand' or 'with gravel'	
			< 15% sand/gravel	'trace sand' or 'trace gravel'	

NOTE: Judgment and experience are required to effectively determine the appropriate grain-size description. If a soil is predominately of one grain size, with traces of another size, it can be described as such. Example: Gray FAT CLAY, trace fine sand. Notice that there is no "y"-ending secondary component.

PLASTICITY OF CLAYS AND SILTS

- A *clay* that can be consistently palm-rolled (and rerolled without additional wetting) to less than 1/16" to 1/32"diameter is described as a **FAT** CLAY.
- A *clay* that can be palm-rolled with ease (and partially rerolled without additional wetting) to less than 1/8" diameter is described as a **LEAN** CLAY.
- A *silt* that can be palm-rolled with ease (and partially rerolled without additional wetting) to less than 1/8" diameter is described as an **ELASTIC** SILT.

GRAVEL DESCRIPTION:

Shape	**Description**
No sharp corners, no straight lines	Rounded
A few blunted corners with very few straight lines	Sub-rounded
A few sharp corners with some straight lines	Sub-angular
Many sharp corners with many straight lines	Angular

NOTE:
"Gravel" has a dual meaning. Gravel refers to particle sizes between ¼" and 3". It can also mean gravel-sized pieces that are *not* native to the soil. If the coarse particles do not appear to be the same mineralogy as the surrounding soil, use the term GRAVEL alone. If they match the mineralogy of the adjacent soil, use GRAVEL but put (rock fragments) in parentheses immediately after it. Example: SANDY SILT with gravel (rock fragments).

CONTAINS: Note the presence of unusual odors, organics, type/condition of organics (roots, branches, leaves, grass/decomposed, fresh, etc.), contamination by other items (construction material, concrete, asphalt pavement debris, wire, brick, etc.). When noting **mica content**, eliminate the word 'contains' and use one of the following three expressions: *slightly micaceous* (few shiny flakes), *micaceous* (common throughout soil), or *highly micaceous* (soil is almost all mica).

RELATIVE DENSITY **Primary Component**

SAND and **GRAVEL**		**SILT** and **CLAY**	
SPT(bpf)	**Density Description**	**SPT(bpf)**	**Density Description**
0 – 3	Very loose	0 – 1	Very soft
4 – 9	Loose	2 – 4	Soft
10 – 29	Medium dense	5 – 8	Firm
30 – 50	Dense	9 – 15	Stiff
> 50	Very dense	16 – 30	Very stiff
		31 – 60	Hard
		> 60	Very hard

MOISTURE:

Characteristic	**Description**
Dusty, dry to touch	Dry
Moisture can be felt, but none visible on sample	Moist
Moisture visible	Wet

INTERMEDIATE GEOMATERIALS (IGM)
***Residual* materials (i.e. displaying parent rock structure) with SPT N-values greater than 50 blows per 6" of penetration** shall be described as IGM (i.e. the geologic origin). The description of the material is constructed depending upon the friability—the ease with which it will break up with hand pressure.

Friable: Describe it as a soil but include a parenthetical reference to the parent rock type. Ex.: IGM, red brown fine SANDY FAT CLAY, very hard, moist (decomposed MUDSTONE)(CH). 'Decomposed' refers to completely weathered, easily friable rock (saprolitic *soil*). 'Highly weathered' refers to substantially discolored, leached, or weathered rock perhaps containing zones of only slightly weathered rock; less friable than 'decomposed' rock.
NON-Friable: Describe it as weathered rock using the adjectives and format for describing rock. Ex.: IGM, highly weathered, moderately hard, medium bedded, gray brown SILTSTONE.

PROJECT #: 0771-053-P42
LOCATION: The Woods Road
STRUCTURE: PIPE

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PAGE 1 OF 1

STATION: 272+78 OFFSET: 30' RT
LATITUDE: 39.030343° N LONGITUDE: -77.586950° W
SURFACE ELEVATION: 318.71 ft COORD. DATUM: NAD 83

Date(s) Drilled: 10/20/2014
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: M. Turner

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
STABILIZED AT 0.7 ft AFTER 24 HOURS

FIELD DATA | **LAB DATA**

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
0											0.0 / 318.71 5" Topsoil			
											0.4 / 318.31 Alluvial, Dark grey brown LEAN CLAY with organics (topsoil, rootlets), moderate organic odor, soft, moist (CL)			45.2
1		WOH												
2		1	75		2									
3		1 2												11.5
4	315	4 6	75		4						2.0 / 316.71 Alluvial, Red brown with grey CLAYEY F-C SAND with f-c subangular to rounded gravel, medium dense, moist (SC)			
5		5 2												19.8
6		4 4	55		6						4.0 / 314.71 Residual, Brown with red brown and yellow brown (mottled) LEAN CLAY, trace f-m sand and fine gravel, slightly micaceous, firm, moist (CL)			
7		7 4									--brown with minor yellow brown, with f-c rock fragments, stiff below 6'			15.0
8		5 7	70		8						--very stiff below 8'			
9	310	9 4												19.2
10		11 11	35		10									
11		8												
12											11.5 / 307.21 Residual, Dark brown CLAYEY F-C SAND with f-c rock fragments, medium dense, moist to wet (SC)			
13		5			13									
14	305	6 4	65											21.7
15		3			15						Boring Terminated at 15.0'			

REMARKS: Rig Type: CME 550 ATV.

PAGE 1 OF 1
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SPT_LOG:THE WOODS ROAD - PIPE AND POND.GPJ:8.30.003:121212:2/19/15

PROJECT #: 0771-053-P42
LOCATION: The Woods Road
STRUCTURE: PIPE

P-2
PAGE 1 OF 1

STATION: 272+62 OFFSET: 36' RT
LATITUDE: 39.030170° N LONGITUDE: -77.587041° W
SURFACE ELEVATION: 317.5 ft COORD. DATUM: NAD 83

Date(s) Drilled: 10/20/2014
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: M. Turner

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
STABILIZED AT 5.0 ft AFTER 24 HOURS

FIELD DATA | **LAB DATA**

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SOIL: SAMPLE LEGEND	SOIL: SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LAB: LIQUID LIMIT (LL)	LAB: PLASTICITY INDEX (PI)	LAB: MOISTURE CONTENT (%)
1		WOH 1 2	80		2						0.0 / 317.5 12" Topsoil			37.5
2	315	2 3	55		4						1.0 / 316.5 Alluvial, Dark grey to dark brown LEAN CLAY with organics (topsoil, rootlets), moderate/strong organic odor, soft, moist (CL)			13.5
3		6 8									2.0 / 315.5 Alluvial/Residual, Dark red brown CLAYEY F-C SAND with f-c gravel, loose, moist to wet (SC)			
4		5 4	80		6						4.0 / 313.5 Residual, Brown LEAN CLAY with f-c sand and fine gravel/rock fragments, stiff, moist (CL)			15.4
5		5 6									--brown, yellow brown and grey (mottled), very stiff below 6'			
6		8 8	85		8									16.4
7	310	7 3									--mainly brown and yellow brown, decrease in gravel content, firm below 8'			
8		3 4	65		10									23.3
9		6												
10														
11														
12	305	11 7	40		13						11.5 / 306.0 Residual, Brown and grey CLAYEY F-C SAND with f-c rock fragments, medium dense, moist to wet (SC)			24.3
13		7 7												
14		7			15									
15											Boring Terminated at 15.0'			

REMARKS: Rig Type: CME 550 ATV.

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P-2

SPT_LOG:THE WOODS ROAD - PIPE AND POND.GPJ;8.30.003:121212:3/6/15

VDOT Virginia Department of Transportation

PROJECT #: 0771-053-P42
LOCATION: The Woods Road
STRUCTURE: PIPE

P-3
PAGE 1 OF 1

STATION: 283+03 OFFSET: 10' LT
LATITUDE: 39.030272° N LONGITUDE: -77.583359° W
SURFACE ELEVATION: 313.75 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/14/2014
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: M. Turner

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
STABILIZED AT 6.3 ft AFTER 48 HOURS

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SOIL: SAMPLE LEGEND	SOIL: SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
0											0.0 / 313.75 8" Topsoil			
											0.7 / 313.05 Residual, Brown with minor red brown LEAN CLAY, trace fine sand and organics (rootlets), soft, moist (CL)			22.3
1		1 2 2	90		2						--brown, yellow brown and grey (mottled), increase in plasticity, no organics, stiff below 2'			21.2
2		3 4 5									4.0 / 309.75 Residual, Red brown with minor yellow brown FAT CLAY, firm, moist (CH)			31.2
3		5 6	90		4						6.0 / 307.75 Residual, Red brown with yellow brown LEAN/FAT CLAY with f-m sand, trace fine rock fragments, firm, moist (CL/CH)			31.7
4	310	3 4 4									8.0 / 305.75 Residual, Red with brown LEAN CLAY with f-c sand, firm, moist (CL)			31.2
5		5 6	90		6									
6		3 4 4	65		8									
7		5												
8		3 4 4	100		10									
9	305	4 5												
10														
11														
12														
13		3 4 4	100		13						--with minor yellow brown, trace fine gravel below 13'			29.3
14	300	4												
15					15						Boring Terminated at 15.0'			

REMARKS: Rig Type: CME 550 ATV.

PAGE 1 OF 1
P-3

SPT_LOG:THE WOODS ROAD - PIPE AND POND.GPJ:8.30.003:121212:2/19/15

Virginia Department of Transportation

PROJECT #: 0771-053-P42
LOCATION: The Woods Road
STRUCTURE: SWM POND

SWM-1
PAGE 1 OF 1

STATION: 270+23 OFFSET: 60' RT
LATITUDE: 39.030265° N LONGITUDE: -77.587902° W
SURFACE ELEVATION: 326.93 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/21/2014
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: M. Turner

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 24 HRS

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SOIL: SAMPLE LEGEND	SOIL: SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
1		2 2 3 5	75		2						0.0 / 326.93 4" Topsoil 0.3 / 326.63 Residual, Red brown LEAN CLAY, trace fine sand, slightly micaceous, firm, moist (CL) --with minor yellow brown, very stiff below 2'			14.5
2	325	6 7 9 10												
3			75		4									13.0
4		6 5 7 7												
5			40		6						--with dark red brown, trace organics (roots), stiff below 4'			17.4
6		4 4 6 6												
7	320		50								6.0 / 320.93 Residual, Red brown, brown and yellow brown F-C SANDY LEAN CLAY, trace fine, friable rock fragments, stiff, moist (CL)			24.9
8		2 4 4 4			8						--increase in rock fragments/gravel, firm below 8'			
9			90											25.9
10					10									
11														
12	315													
13		4 3 5 5			13									
14			85											23.7
15					15						Boring Terminated at 15.0'			

REMARKS: Rig Type: CME 550 ATV.

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SWM-1

SPT_LOG:THE WOODS ROAD - PIPE AND POND.GPJ:8.30.003:121212:2/19/15

Virginia Department of Transportation

PROJECT #: 0771-053-P42
LOCATION: The Woods Road
STRUCTURE: SWM POND

SWM-2
PAGE 1 OF 1

STATION: 271+67 OFFSET: 181' RT
LATITUDE: 39.029833° N LONGITUDE: -77.587491° W
SURFACE ELEVATION: 317.94 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/24/2014
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: M. Turner

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
NO LONG TERM MEASUREMENTS TAKEN

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
0											0.0 / 317.94 6.0" Crushed Aggregate			
1		3 7 3	55		2						0.5 / 317.44 Possible Fill, Dark red brown F-C SANDY LEAN CLAY FILL with f-c gravel, stiff, moist (CL)			17.2
2		3 4 5												
3	315		85		4						2.0 / 315.94 Residual, Brown and tan LEAN CLAY with f-c sand, trace fine rock fragments, stiff, moist (CL)			21.6
4		3 5 6												
5			90		6									21.9
6		4 6 6												
7			40		8									20.3
8	310	3 5 6	85		10									18.1
9														
10														
11														
12											11.5 / 306.44 Residual, Dark brown to dark red brown CLAYEY F-C SAND/F-C SANDY LEAN CLAY with fine gravel, loose/firm, moist (SC/CL)			
13	305	3 4 4	85		13									17.8
14														
15					15									
16														
17														
18	300	3 3 5	65		18						--with grey below 18'			20.4
19														
20		4			20						Boring Terminated at 20.0'			

REMARKS: Rig Type: CME 550 ATV.

PAGE 1 OF 1
SWM-2

SPT_LOG:THE WOODS ROAD - PIPE AND POND.GPJ;8.30.003:121212:2/19/15

VDOT Virginia Department of Transportation

PROJECT #: 0771-053-P42
LOCATION: The Woods Road
STRUCTURE: SWM POND

SWM-3
PAGE 1 OF 1

STATION: 284+55 OFFSET: 87' RT
LATITUDE: 39.030009° N LONGITUDE: -77.582821° W
SURFACE ELEVATION: 315.68 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/14/2014
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: M. Turner

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
STABILIZED AT 0.8 ft AFTER 48 HOURS

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL: STANDARD PENETRATION TEST HAMMER BLOWS	SOIL: SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	ROCK: CORE RECOVERY (%)	ROCK: ROCK QUALITY DESIGNATION	ROCK: DIP ° STRATA	ROCK: DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
1	315.68	1									0.0 / 315.68 3" Topsoil			
2	314	2 2	90		2						0.3 / 315.38 Residual, Brown LEAN CLAY, trace fine sand, slightly micaceous, soft, moist (CL) --with f-c sand, firm below 2'			26.8
3		2 2 3												
4	312	3 3 5 6	90		4						--with minor tan below 4'			22.8
5			95											22.4
6	310	2 3 3 7			6									
7			75								6.0 / 309.68 Residual, Brown, yellow brown and red brown LEAN CLAY, trace fine sand, firm, moist (CL)			29.2
8	308	3 3 5 6			8						--sand becomes f-c, stiff below 8'			
9			15											30.0
10	306	5 4			10						Boring Terminated at 10.0'			

REMARKS: Rig Type: CME 550 ATV.

PAGE 1 OF 1
SWM-3

SPT_LOG:THE WOODS ROAD - PIPE AND POND.GPJ;8.30.003:121212:2/19/15

VDOT Virginia Department of Transportation

PROJECT #: 0771-053-P42
LOCATION: The Woods Road
STRUCTURE: SWM POND

SWM-4
PAGE 1 OF 1

STATION: 286+19 OFFSET: 145' RT
LATITUDE: 39.029856° N LONGITUDE: -77.582242° W
SURFACE ELEVATION: 321.09 ft COORD. DATUM: NAD 83

Date(s) Drilled: 10/14/2014
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: M. Turner

GROUND WATER
NOT ENCOUNTERED DURING DRILLING
DRY AFTER 48 HRS

FIELD DATA												LAB DATA		
		SOIL				ROCK								
DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP ° STRATA	DIP ° JOINTS	STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT LL	PLASTICITY INDEX PI	MOISTURE CONTENT (%)
1	320	2 2 4 5	85		2						0.0 / 321.09 3" Topsoil 0.3 / 320.79 Residual, Brown LEAN CLAY with f-c sand, trace organics (rootlets), firm, moist (CL)			21.7
2		5 5 7 10									--no organics, slightly micaceous, stiff below 2'			
3			85											16.0
4		4 4 5 7			4						4.0 / 317.09 Residual, Brown with minor tan F-C SANDY LEAN CLAY, trace fine gravel, stiff, moist (CL)			
5			90											22.2
6	315	2 3 3 4			6						6.0 / 315.09 Residual, Dark brown to dark red brown LEAN CLAY, trace f-c sand, firm, moist (CL)			
7			90											28.5
8		2 2 3 5			8						--with grey and black, increase in plasticity (possible CH) below 8'			
9			100											27.8
10					10									
11	310													
12											11.5 / 309.59 Residual, Brown, red brown and tan FAT CLAY, firm, moist (CH)			
13		3 3 3 3			13									
14			85											32.0
15					15						Boring Terminated at 15.0'			

REMARKS: Rig Type: CME 550 ATV.

PAGE 1 OF 1
SWM-4

SPT_LOG:THE WOODS ROAD - PIPE AND POND.GPJ:8.30.003:121212:2/19/15